

Statistics

Lecture 4



Feb 19-8:47 AM

I randomly selected 20 exams and here are the scores.

72	86	100	95	88
65	75	80	83	100
58	70	80	90	98
60	79	82	93	75

Store them in a list.

clear all lists

2nd **+** **4:Clear All lists**
Enter

Reset all lists

STAT **Edit**
5:SetupEditor **Enter**

To store the data in a list

STAT **Edit**
1:Edit

L1
72 Enter
86 =
...
75 Enter

To make sure we entered correctly
↑ **↑** **↑**

Quit & clear screen

2nd **MODE** **clear**

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To view the list

2nd 1 Enter
L1

{ 72 86 100 95 ... 75 }
→ → →
← ← ←

Let's Sort the data, view it again and
make Stem Plot

STAT Edit

2:SortA end 1 Enter
L1

2nd 1 Enter
L1

{ 58 60 65 70 72
→ → →

5|8
6|05
7|02559
8|002368
9|0358
10|00

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Let's find $\bar{x}$ & s

STAT → CALC
1:1-Var Stats

With Menu	No Menu
List: L1	1-Var Stats
Freq List: Clear	L1
<u>Calculate</u>	<u>Enter</u>

$\bar{x} = 81.45$

$s = s_x = 12.593$

↓ $n = 20$

Min. = 58

↓

$Q_1 = 73.5$

↓

Med. = 81

$Q_3 = 91.5$

Max = 100

Let's find s^2 in
reduced fraction.

VARS 5: Statistics 3: s_x

x^2 Enter 158.5763158

Math 1: ▸ Frac Enter

$s^2 = \frac{60259}{380}$

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5|8
6|05
7|02559
8|002368
9|0358
10|00

```

$$1) n = 20$$

$$2) \text{Range} = 100 - 58 = 42$$

$$3) \text{Midrange} = \frac{100 + 58}{2} = 79$$

$$4) \text{Mode } 75, 80, 100$$

$$5) \text{Estimate } S \approx \frac{\text{Range}}{4} = \frac{42}{4} = 10.5$$

6) class width if we wish to have

a) 3 classes

$$CW = \frac{\text{Range}}{3} = \frac{42}{3} = 14$$

$$\boxed{CW = 15}$$

b) 5 classes

$$CW = \frac{\text{Range}}{5} = \frac{42}{5} = 8.4$$

$$\boxed{CW = 9}$$

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$$\text{Min.} = 58$$

$$Q_1 = 73.5$$

$$\text{Med.} = 81$$

$$Q_3 = 91.5$$

$$\text{Max} = 100$$

$$1) IQR = Q_3 - Q_1 = 91.5 - 73.5 = \boxed{18}$$

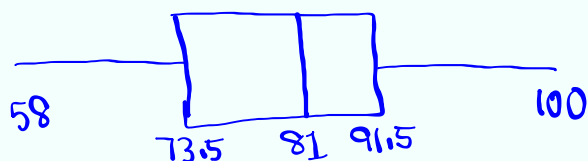
$$2) \text{upper fence } Q_3 + 1.5(IQR) \\ = 91.5 + 1.5(18) = \boxed{118.5}$$

$$3) \text{Lower fence } Q_1 - 1.5(IQR) \\ = 73.5 - 1.5(18) = \boxed{46.5}$$

4) Discuss outliers

None

5) Draw Box Plot



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$$\bar{x} = 81.45 \approx 81$$

$$S = 12.593 \approx 13$$

By Empirical Rule

68% Range $\bar{x} \pm S = 81 \pm 13 \Rightarrow \boxed{68 \text{ to } 94}$

Usual Range $\bar{x} \pm 2S = 81 \pm 2(13) \Rightarrow \boxed{55 \text{ to } 103}$

95% Range

Find a data element with Z-score of 1.75.
Round to a whole #.

$$Z = \frac{x - \bar{x}}{S}$$

$$1.75 = \frac{x - 81}{13}$$

Cross-Multiply

$$x - 81 = 13(1.75)$$

$$x = 81 + 13(1.75)$$

$$= 103.75$$

$$\approx \boxed{104}$$

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5	8
6	0 5
7	0 2 5 5 9
8	0 0 2 3 6 8
9	0 3 5 8
10	0 0

location

1) Find P_{10}

$$L = \frac{10}{100} \cdot 20 = 2$$

$$P_{10} = \frac{\text{end element} + \text{next one}}{2}$$

$$= \frac{60 + 65}{2} = \boxed{62.5}$$

$$\begin{array}{c} 10\% \quad 90\% \\ \hline P_{10} = 62.5 \end{array}$$

2) P_{63}

$$L = \frac{63}{100} \cdot 20 = 12.6 \quad L = 13$$

$P_{63} = 13\text{th element}$

$$= \boxed{86}$$

$$\begin{array}{c} 63\% \quad 37\% \\ \hline P_{63} = 86 \end{array}$$

3) Find K such that $P_K = 70$

$$K = \frac{B}{n} \cdot 100$$

$$= \frac{3}{20} \cdot 100 = 15$$

$$P_{15} = 70$$

Round to whole %

$$\begin{array}{c} 15\% \quad 85\% \\ \hline P_{15} = 70 \end{array}$$

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Complete the chart below

class limits	class BNDRS	class MP	class F	Cum. F	Rel. F	% F
10 - 24	9.5 - 24.5	17	5	5	.125	12.5%
25 - 39	24.5 - 39.5	32	11	16	.275	27.5%
40 - 54	39.5 - 54.5	47	19	35	.475	47.5%
55 - 69	54.5 - 69.5	62	5	40	.125	12.5%

4 classes, CW = 25 - 10 = 15 $n = 40$ Rel. F = $\frac{f}{n} = \frac{5}{40}$

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How to find $\bar{x}$ & S of a group data:

clear all lists 2^{nd} $+$ 4^{th} clear All lists $\rightarrow$ Enter

class MP $\rightarrow$ L1

class F $\rightarrow$ L2

STAT Edit
1: Edit

L1	L2
17	5
32	11
47	19
62	5

STAT $\rightarrow$ CALC
1: 1-Var Stats

with Menu

List: L1

Freq List: L2

Calculate

No Menu

1-Var Stats

L1, L2

enter

quit & clear the Screen
 2^{nd} MODE Clear

$\bar{x} = 41$

S = 13.068

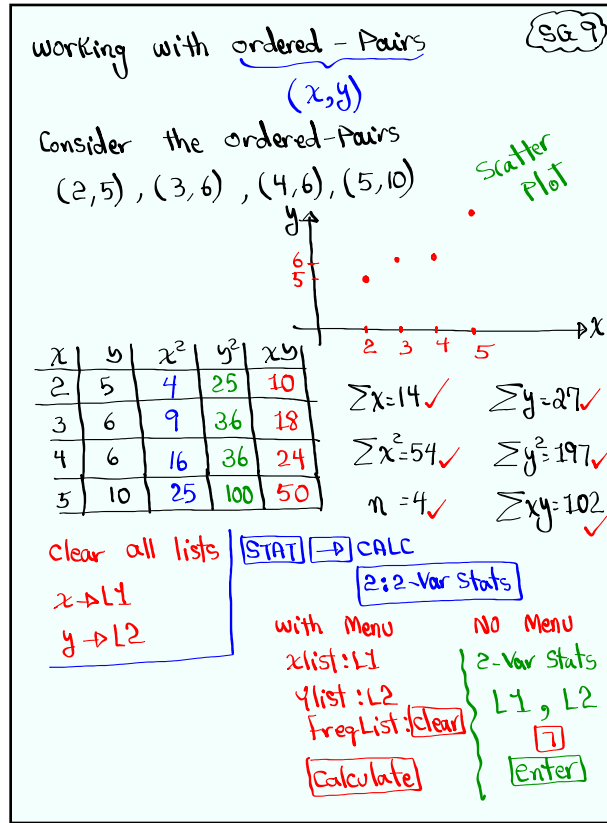
find S^2 in reduced fraction.

VARS 5: Statistics 3: Sx x^2

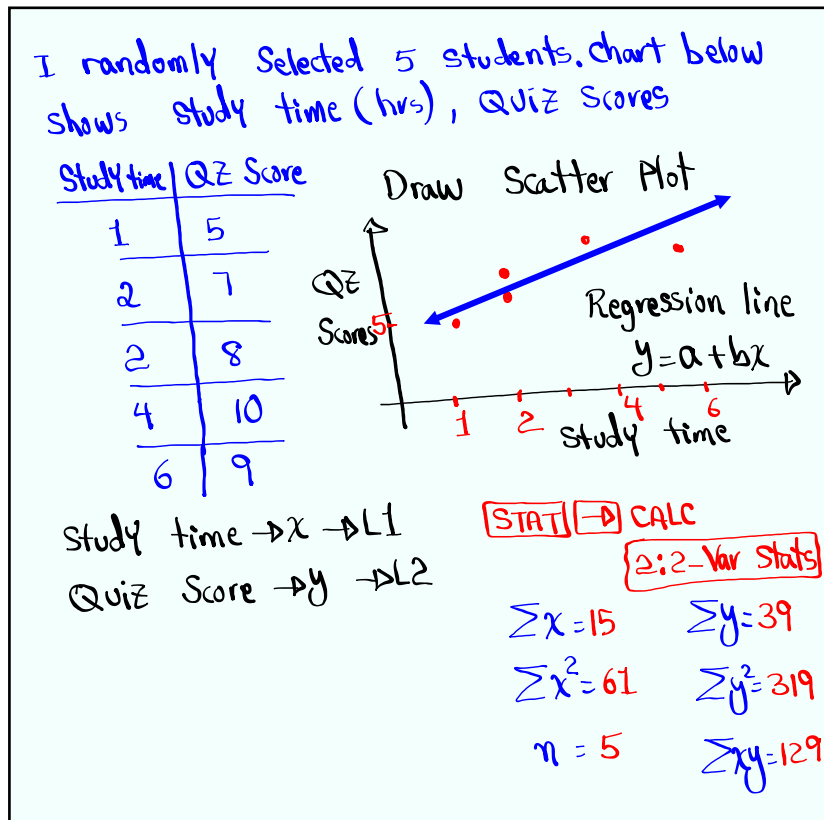
Math
1: Δ frac
Enter

$S^2 = \frac{2220}{13}$

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Jul 1-5:57 PM



Jul 1-6:10 PM

How to find equation of the regression line using TI:

[STAT] → [CALC]

8: LinReg(a+bx)

xlist: L1

freqList: L2

[clear]

[Calculate]

No Menu

L1, L2 **[enter]**

[=]

$a = 5.55$

$b = .75$

$r^2 = .608$

$r = .780$

$\Rightarrow y \approx 5.55 + .75x$

If r & r^2 are missing:

[end] [0] ↓ ↓ ↓ ↓

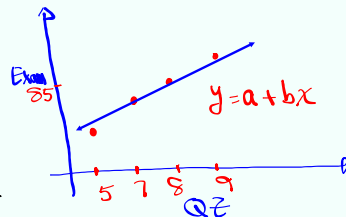
► Diagnostic On

[Enter] [Enter]

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I randomly selected 4 students, chart below displays QZ Score & Exam Score

QZ Score	Exam Score
8	85
7	80
9	95
5	65



QZ → x → L1

Exam → y → L2

use 2-Var Stats

$\sum x = 29$

$\sum y = 325$

$\sum x^2 = 219$

$\sum y^2 = 26875$

$n = 4$

$\sum xy = 2420$

use LinReg(a+bx)

$a = 28.429 \approx 28$

$b = 7.286 \approx 7$

$r^2 = .991$

$r = .995$

$\Rightarrow y \approx 28 + 7x$

$x = 5 \rightarrow y = 28 + 7(5) = 63$

$x = 10 \rightarrow y = 28 + 7(10) = 98$

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How do we use r ?

when r is Significant,

use the regression line to make
Prediction

Plug in $x \rightarrow$ find y

when r is not significant,

use $\bar{y}$ as the prediction value

$$\bar{y} = \frac{\sum y}{n}$$

or

VARs

5: Statistics

5: $\bar{y}$

Enter

$$\bar{y} = 81.25 \approx 81$$

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What is r ?

r is the linear Correlation Coefficient.

$$-1 \leq r \leq 1$$

when r is close to ± 1 ,

Linear Correlation is Significant.

when r is close to 0,

Linear Correlation is not Significant.

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What about r^2 ?

r^2 is the Coef. of determination

Always round to whole%.

Last example $r^2 = .991$

$$r^2 \approx 99\%$$

r^2 in % tells us what % of y -values are explained by x -values.

99% of exam scores are explained by quiz scores.

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Class QZ 1 (open Notes)

Consider the Sample below

5	8	8	10
6	7	5	9

Find

1) $\bar{x} = 7.25 \approx \boxed{7.3}$ } Round to

2) $S = 1.832 \approx \boxed{1.8}$ } 1-decimal

3) $S^2 = \boxed{\frac{47}{14}}$ } Reduced fraction

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